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THE PLANT DISEASE REPORTER

Issued By

Division of Mycology and Disease Survey

Volume XX Number 6

April 1, 1936.

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XX April 1, 1936 Number 6

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THE UTAH TOMATO DISEASE SITUATION IN 1935

H. L. Blood

When the actual production of tomatoes is compared with the potential production of the planted acreage, based on the average per acre yield for the State of Utah from 1917 to 1934, exclusive of years of curly-top epidemics, it appears that Utah lost at least 60 percent of its tomato crop in 1935, representing a monetary loss of approximately $2,425,900. This loss was occasioned largely by curly-top disease and the tomato fruit worm (corn ear worm). A statement of the injury caused by the tomato fruit worm will be included in the Insect Pest Survey Bulletin issued by the Bureau of Entomology and Plant Quarantine. Verticillium and Fusarium wilts, bacterial canker, and mosaic have also been troublesome in the State for many years. The loss from these diseases has been considered as a normal annual factor in tomato production. It has expressed itself in a reduction in the average annual per acre yield over the 17-year period that hasbeen used as a basis for computing the loss suffered from the unusually severe outbreak of curly top and the serious infestation of fruit worm prevailing during 1935.

Curly Top

While survey work was not extensive during 1935, a sufficient number of observations were made to determine the relative severity of curly top in the respective tomato growing districts of the State. Table 10 gives some idea of the relative progress of the disease during the year and of the severity of the disease as shown by mid-season field counts. Figure 23 locates the districts in which disease observations were made and relates them to the general physiographical features of the region.

Towards the end of the 1935 growing season there were very few fields that carried less than 25 percent curly top, and these were to be found in the Clearfield, Layton (East) and Kaysville (East) districts of Davis County and in the Springville district of Utah County near and among the foothills of the Wasatch mountain range. In the remainder of the region all fields showed from 25 to 100 percent of infected plants. The most serious infestation was found in the districts west of Ogden around Kanesville, Taylor, and Hooper, thence south along the shores of the Great Salt Lake at West Point, Syracuse, West Layton, West Kaysville, and Farmington. In these districts a great many fields were totally destroyed and abandoned; many fields were plowed up in midsummer and planted to corn or late potatoes. To offset the severe destruction in the Lake shore districts, the fields along the foothills of the mountains in the eastern portion of the cultivated area lying between the Wasatch range and the Great Salt Lake were very productive. A long and

Fig. 23. Map of Utah showing relation of tomato producing districts to general physiographical features of the region and to adjacent beet leaf hopper breeding areas.

Table 10 Summary of Tomato Curly-top Survey in Utah, 1935

District	Date	Number of Fields Visited	Records Made	Curly-top Percent
	June 23			
Roy		4	9	27.1
				27.1
	July 5			
Clearfield		4	6	15.0
Syracuse		4	12	49.66
West Point		2	3	52.0
West Layton		1	2	59.5
West Kaysville		1	2	34.0
Percent based on total counts on July 5				37.43
	July 19-20			
Tremonton		9	21	51.43
Elwood		3	7	43.71
Bear River City		3	7	55.43
W. Honeyville		3	7	43.57
Corinne		3	7	50.43
Brigham City		1	2	71.5
E. American Fork		1	1	80.00
Vineyard		5	10	25.9
Orem		3	7	33.71
West Mountain		1	2	36.5
Payson		3	10	38.1
Salem		1	5	31.6
Percent based on total counts, July 19-20				43.74
	Aug. 19-20			
Roy		3	5	54.6
Sunset		1	1	56.
West Point		4	4	43.
Clearfield		1	1	15.
Percent based on total counts, August 19-20				46.91
	Aug. 27			
Tremonton		2	3	59.0
				59.0
	Sept. 12			
Roy		1	1	69.
Clearfield		1	1	36.
West Layton		2	3	83.33
Taylor		1	1	95.
Farmington		1	1	92.
Percent based on total counts, September 12				77.43

particularly favorable growing season made possible the harvesting of a very good crop in fields with a low or moderate amount of curly-top infection.

In Boxelder County as a whole the destruction approximated 50 percent of the crop. While such destruction is serious, the disease was not as devastating as it has been during epidemics in the past. Here again those fields toward the west, nearest the natural breeding grounds of the beet leaf hopper (Eutettix tenellus) were most heavily infested.

In general, the destruction in Utah County was less extensive than in the counties to the north, although the disease was serious in certain small local areas. The heaviest destruction was observed in fields north of Lehi and American Fork bordering the foothills of the Jordan Narrows. Fields of tomatoes and also of squash in this district were almost completely destroyed. In the spring of the year the hills of the Jordan Narrows were so completely covered with filaree (Erodium cicutarium) that they were a mass of pink while the plant was in blossom. It has been shown that this plant is an excellent early spring breeding host for the leaf hopper. Following winters which permit the leaf hopper to survive in considerable numbers such areas of filaree provide very effective breeding places for the development of the first spring brood. Later in the spring when the filaree fruits and dries up, the insects migrate to the irrigated fields to the south and around Lehi and American Fork and to the north around Draper.

The acreage of market garden tomatoes around Bountiful, Taylorville, Granger, and Magna was seriously damaged. In the Granger and Magna districts tomato culture has been practically abandoned because of the severity of the curly-top disease. The same is true of the Draper district in the southern end of the Salt Lake Valley. At one time the Draper district supported a thriving canning plant but in recent years the plant has been closed and tomato production reduced proportionately.

Upon the basis of actual production and the prevalence of the disease it has been conservatively estimated that curly top has reduced the 1935 tomato crop approximately 47 percent representing a loss in the neighborhood of $1,900,000. This is approximately 78.3 percent of the total loss suffered by the industry in Utah. These figures do not take into account the losses in gardens grown for home consumption. In eastern, central, and southern Utah tomatoes in home gardens were a total failure.

Curly top completely destroyed the cucumber seed crop of a small cultivated section around Moab in eastern Utah. The loss based upon production estimates of a local seed company would amount to approximately

$11,460. From the 95.5 acres of cucumbers which should have yielded 500 pounds to the acre, a grand total of 100 pounds were actually harvested.

Considerable damage occurred in the cantaloupe fields around Greenriver in eastern Utah. The people living in this little valley of several thousand acres admirably suited to melon production virtually depend upon the melon crop for their existence. They ship hundreds of car loads to eastern markets every year. The initial development of curly top in this district caused considerable consternation, but while the damage to the crop was extensive it did not reach the proportions at first expected.

Beans were rather seriously infected with curly top throughout northern Utah and southern Idaho. Several fields in the Syracuse, West Point, and Hooper districts were a total loss and a few fields were visited in the Bear River City District of Boxelder County that showed 25 to 40 percent infection. The bean fields of the Twin Falls and Boise projects in Southern Idaho showed heavy infections this past year. In all of the fields visited the infection ranged from 10 to 70 percent. A sufficiently large number of fields were not visited to permit an approximation of the destruction due to the disease in this region, but according to reports the 1935 curly-top infection in beans was one of the worst in the history of the bean industry in southern Idaho. The varieties grown for seed purposes in this region are more susceptible to curly top than the commercially grown Great Northern.

Verticillium Wilt (*Verticillium alboatrum*)

Wilt of the Verticillium type was found to be present in 39.5 percent of the fields visited during the summer. The Fusarium type of wilt was observed in only one field. In thirteen of these fields the Verticillium disease was comparatively serious and in four fields the disease was very destructive. In two of the four fields the disease was practically entirely responsible for a major crop loss.

Observations during the past few years have definitely indicated a close relationship between the presence of wilt and the development of fruit sun scald. Other factors, however, have been observed to be more or less important in the sun scald situation. In order to obtain some idea of the relative degree to which wilt contributes to sun scald, material was collected from plants showing either positive evidence of wilt contributing to fruit sun scald or exhibiting fruit sun scald in a marked degree. From this material 58 isolations were made of which 48 yielded *Verticillium* sp., 1 *Fusarium* sp., and 9 nothing but an occasional bacterial contaminant.

Wilt-infested fields were found in every section of the State. Seriously infested fields were found in Clearfield, West Layton, Farmington, Orem, Roy, Sunset, and Tremonton.

In spite of the relative prevalence of wilt of the Verticillium type the damage from sun scald was very low as compared with former years. The Canner's Association estimate the damage at 2 percent. The wilt itself was responsible for a loss in production of approximately 3 percent giving a total loss of approximately 5 percent or $202,100 from the related diseases of wilt and sun scald.

A preliminary study of the factors contributing to sun scald has revealed at least four that should be given consideration.

I. The Disease Factor.

a. Verticillium Wilt (Verticillium alboatrum) This disease usually expresses itself in a very mild form in the State in general and, except under conditions most favorable to the fungus, induces a yellowing and subsequent dropping of the large basal leaves of the infected plant, leaving the large crown set of fruit exposed to the direct rays of the sun. When the disease development is early and comparatively severe the entire foliage is rather sparse and dwarfed or rosetted. The set of small fruit that usually develops on such plants is exposed to the sun early and severely scalded.

b. Other diseases. Any disease that destroys the foliage, such as bacterial canker, streak, spotted wilt or any of the root rots, contributes to sun scald. These diseases, with the exception of canker which is becoming less prevalent, appear only occasionally but wherever present they usually increase the sun scald injury.

2. The Irrigation Factor. Many growers have adopted the policy of irrigating their tomato fields heavily about the middle of August on the assumption that such irrigations retard the vegetative development of the plants and hasten ripening of the fruit. Moderate irrigations about that time may be of considerable benefit but the wisdom of heavy irrigations may be vigorously questioned. Whatever the physiological effect of the heavy irrigations may be, certain responses on the part of the plant are very evident and the intensity of the responses appears to be proportional to the amount of water applied. Almost immediately after the application of water further vegetative development stops, the vines droop and assume a yellowish or grayish green, senile appearance. The large central leaves turn yellow and drop off, exposing many of the large fruits to the direct rays of the sun in such a manner as to induce sun scald. A discoloration of the vascular tissue at the base of the stem is often induced from which nothing but an occasional bacterium may be isolated.

Excessive irrigation not only contributes to an intensification of sun scald but it exercises such a drastic check on growth that not only the vines but also the fruits stop growing and a short picking season and low yield results. The small immature fruits, if they do not scald, mature and ripen long before they attain a normal size. Such fields rapidly lose productiveness and all saleable fruit are usually picked long before the season is over, especially in seasons of delayed fall freezes. Early-season light frosts which are not severe enough to destroy the remaining crop but are severe enough to do some damage are always much more destructive in heavily irrigated fields than in fields maintaining a fair degree of vine development.

3. The Fertility Factor. Sun scald is usually rather severe in tomato fields on soil of low fertility. Tomatoes should never be planted on many of the light sandy loam soils abounding in the tomato producing sections of Weber, Davis, and Utah Counties. Soils of low fertility produce comparatively small vines with sparse foliage that affords poor protection for the fruit. In response to low fertility leaves drop during the period of heavy physiological drain accompanying the maturation of the fruit, and again the fruits are exposed to the sun's rays and scalded.

4. The Vine Abuse Factor. Stepping on the crowns of plants, cutting roots with a shovel, and undue tearing of the vines during picking are responsible for an increase in the degree of sun scald as the season progresses. All such practices tend to destroy the natural foliar covering of the fruit and the intense rays of the sun on an exposed fruit will always result in the development of scald.

Bacterial Canker (Aplanobacter michiganense)

Seventeen percent of the fields entered during summer surveys were found to be infected with canker. Many of the visits to diseased fields were made in response to calls of factory field men for the purpose of making observations, consequently, the proportion of fields noted as showing canker infestation can not be considered as indicative of the total proportion of fields carrying the disease in the State. Canker varied from a trace to practically 100 percent of plants surviving the epidemic of curly-top. The majority of the fields in which canker was found showed infection in a very low percentage of the plants. In general, losses from the disease would not amount to more than 1 percent of tomatoes grown in the State valued at approximately $40,000. The disease was most prevalent in fields of the Moscow variety grown from seed saved from home plantings by the Japanese in the vicinities of Ogden, Roy, and Hooper. Home grown plants produced by a number of local growers from local and Eastern seed carried a rather heavy canker infection and caused serious damage in a few fields in the Roy and Clinton districts.

Fields grown from fermented seed produced by one large packing company appeared to be absolutely free from the disease. Field men of this company were requested to report all suspected cases of the disease from company fields planted with plants from company seed but not one report was filed. Another canning company also used this fermented seed and not the slightest indication of canker was found in any of their fields visited and their field men knew of no case of the disease appearing in any of their fields.

Canker was found in plants from seed secured from Rocky Ford, Colorado, and grown at Brigham City, Utah. In one instance 10 percent canker was found in a portion of a field planted with Pritchard, Monumental, and Baltimore seed obtained from the East, while a portion of the same field planted with Potato Leaf from fermented western seed was entirely free.

No attempt is made to report damage by districts, but in general the Japanese population in south Weber and north Davis Counties are most active in perpetuating the disease. Some fields in the Orem and the Honeyville districts carry the disease each year.

Seed grown locally by Japanese farmers and a few American seedmen, and local seed-bed infection seem of primary importance in canker infection in the State at present although introduced seed at times carries infection. It is evident from the results secured that canker can be eliminated from seed stocks and field damage prevented by the fermentation seed-extraction process followed by a seed treatment and proper seed-bed management.

Virus diseases

Mosaic is very widely distributed throughout the Utah tomato growing districts every year, but it is a serious factor in tomato production only when present in fields offering rather poor growing conditions. Streak infection was observed in only a few fields but when it does occur it is very destructive. These two diseases were estimated as being responsible for .5 percent or approximately $20,000 loss to the tomato industry.

SUMMARY OF POTATO DISEASE RECORDS FROM CERTIFICATION INSPECTIONS IN NEBRASKA FOR THE PAST FIVE YEARS

R. W. Goss

These records are not representative of the commercial potato crop in the State. Neither do they give an accurate picture of the amount of

disease present in the certified fields, due to the fact that diseased plants are rogued out continuously during the summer, and the worst fields at any one inspection are rejected and therefore do not appear in the record of subsequent inspections.

Table 11. Summary of disease records from Nebraska potato certification inspections, 1931 to 1935.

1931

Disease	Inspections					
	First		Second		Bin	
	519 Fields 10749 acres		507 fields 10537 acres		446 lots 699,182 bushels	
	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Mild mosaic	12.3	0.2	9.9	0.1	-	-
Rugose mosaic	9.6	0.2	3.7	0.1	-	-
Spindle tuber	31.7	0.2	45.1	0.3	22.9	0.7
Unmot.curly dwarf	0.6	0.2	2.1	0.1	-	-
Curly dwarf	1.1	0.1	9.6	0.1	-	-
Black leg	6.3	0.2	10.0	0.3	5.8	0.1
Fusarium wilt a/	87.6	1.5	69.3	0.5	81.9	3.1
Early blight	3.9	tr	tr	tr	15.5	6.8
Rhizoctonia	5.7	tr	27.7	tr	35.4	0.2
Common scab b/	-	-	-	-	60.1	6.1
Pitted scab b/	-	-	-	-	19.5	7.8

1932

Disease	Inspections: First: 443 fields, 9,659 acres		Second: 443 fields, 8,742 acres		Bin: 362 lots, 470,425 bushels	
	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Mild mosaic	17.2	0.1	8.4	0.2	-	-
Rugose mosaic	9.7	0.1	1.6	0.1	-	-
Spindle tuber	47.8	0.2	25.7	0.3	17.1	0.4
Unmot.curly dwarf	1.2	0.1	tr	tr	-	-
Curly dwarf	2.3	0.1	tr	0.1	-	-
Black leg	6.6	0.2	5.9	0.1	2.8	0.3
Fusarium wilt a/	45.1	0.4	84.0	1.9	98.0	3.7
Early blight	2.7	tr	37.5	0.3	8.6	3.2
Rhizoctonia	50.3	tr	43.8	tr	20.9	3.8
Common scab b/	-	-	-	-	48.6	7.2
Pitted scab b/	-	-	-	-	11.8	5.8

1933

Disease	Inspections: First: 433 fields, 8,984 acres		Second: 390 fields, 8,087 acres		Bin: 340 lots, 812,187 bushels	
	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Mild mosaic	5.3	0.1	23.5	0.43	-	-
Rugose Mosaic	1.9	0.2	5.2	0.2	-	-
Spindle tuber	36.7	0.3	36.5	0.3	28.5	0.3
Unmot.curly dwarf	3.2	0.1	0.5	0.2	-	-
Curly dwarf(comb.)	2.3	0.1	0.5	0.1	-	-
Black leg	1.4	0.1	2.3	0.2	2.1	0.5
Fusarium wilt a/	46.6	0.3	95.2	2.4	86.2	3.2
Early blight	-	-	4.9	tr	9.1	3.4
Rhizoctonia	-	-	-	-	17.6	2.1
Common scab b/	-	-	-	-	47.3	4.8
Pitted scab b/	-	-	-	-	23.8	6.4

1934

Disease	Inspections: First: 418 fields, 9,162 acres		Second: 302 fields		Bin: 314 lots	
	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Mild mosaic	1.7	0.1	5.5	0.2	-	-
Rugose mosaic	4.8	0.1	5.8	0.3	-	-
Spindle tuber	33.5	0.5	26.0	0.4	34.2	0.1
Unmot. curly dwarf	0.7	0.1	1.0	0.1	-	-
Curly dwarf (comb.)	0.2	0.1	0.3	0.1	-	-
Black leg	2.6	0.1	1.7	0.1	0.6	tr
Fusarium wilt a/	64.6	0.6	90.5	1.4	81.5	2.0
Early blight	-	-	-	-	2.9	tr
Rhizoctonia	-	-	-	-	32.9	1.4
Common scab b/	-	-	-	-	43.5	1.3 c/
Pitted scab b/	-	-	-	-	3.5	0.1 c/

1935

Disease	Inspections: First: 538 fields, 11,037 acres		Second: 506 fields, 10,480 acres		Bin: 400 lots, 961,387 bushels	
	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field	Fields infected	Aver. per infected field
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Mild mosaic	13.1	0.2	15.6	0.1	-	-
Rugose mosaic	4.8	0.1	2.7	0.1	-	-
Spindle tuber	50.0	0.4	49.8	0.3	52.5	0.5
Unmot. curly dwarf	1.5	0.1	0.6	0.1	-	-
Curly dwarf (comb.)	3.2	0.1	1.0	0.1	-	-
Black leg	10.8	0.1	3.4	0.2	1.3	0.7
Fusarium wilt a/	20.6	0.2	77.8	0.9	97.8	2.4
Early blight	0.2	-	2.0	-	7.7	0.5
Rhizoctonia	-	-	-	-	33.5	2.5
Common scab b/	-	-	-	-	61.0	6.1
Pitted scab b/	-	-	-	-	35.2	6.0

a/ F. eumartii and F. oxysporum

b/ Scab in these tables equals scab culls, usually more than 2 to 3 percent of tuber surface infected.

c/ Dry year.

(Nebraska Agricultural Experiment Station)

BEAN DISEASES IN NEBRASKA IN 1935

R. W. Goss and A. Afanasiev

These records were made during careful surveys of commercial fields in the irrigated bean growing section of western Nebraska. Most of these fields are planted with Idaho certified Great Northerns or one year removed from this source.

The absence of halo blight was very noticeable.

Common bacterial blight (Bacterium phascoli).

Date	Number of fields	Amount of infection
August 20	28 (500 acres)	Leaf infection in all fields, averaging 12.8 percent slight. Pod infection in 21 fields, averaging 9.5 percent slight.
September 4	15	Leaf infection in all fields, averaging 28 percent slight. Pod infection in all fields, averaging 9.5 percent slight.

Bacterial wilt (Bacterium flaccumfaciens) was found in 4 fields of 28 examined. Infection averaged 0.5 percent.

Halo blight (Bacterium medicaginis phaseolicola) was not observed.

Mosaic (virus) was found in all the 28 fields of irrigated Great Northern surveyed. Infection averaged 1 percent. (Nebraska Agricultural Experiment Station).

NOTES ON BLUEBERRY FUNGI

Marguerite S. Wilcox

Several fungi previously described as occurring on the cranberry (Vaccinium macrocarpon) have been isolated in culture from diseased portions of the cultivated blueberry (V. corymbosum). Helminthosporium inaequale Shear, a rare cause of cranberry fruit rot, was isolated from dying blueberry leaves, twigs, and badly diseased nursery stock in New Jersey. Melanspora destruens Shear and Pestalozzia guepini vaccinii Shear, infrequent causes of storage rot in cranberry, were found on blueberry collections in Massachusetts, New Jersey, and North Carolina. Melanospora was isolated from root bark and badly diseased nursery canes, Pestalozzia from

bark, crown, leaves, twigs, and seedlings. Spaeropsis malorum Pk., the apple black-rot fungus, has been reported on numerous deciduous hosts in the eastern United States, but has been collected only once on the cranberry and that in Massachusetts. Bark taken at the junction of the green and discolored areas of blueberry twigs collected from severely defoliated and dying plants at Whitesbog, New Jersey, developed 45 percent Sphaeropsis malorum in culture. Sphaeropsis was also isolated from shoots originating at the base of drastically pruned nursery stock near New Lisbon, New Jersey, and from root bark at Atkinson, North Carolina. Of interest also is the occurrence of the current cane-blight fungus, Dothiorella ribis Gros. & Dug., isolated from dying leaves and from pieces of bark cut below the petiole attachment of a potted plant at Pemberton, New Jersey.

The collections and cultures of diseased blueberry material were made in Massachusetts during the summers of 1933 and 1934, and in New Jersey and North Carolina during the summer of 1935. Alternaria sp. occurred more frequently than any other fungus, appearing in 18.5 percent of the cultures made from the New Jersey and North Carolina collections, and in a considerably higher percentage of the Massachusetts cultures. Phomopsis sp. was isolated in New Jersey from seedlings, bark, and twigs of severely defoliated and dying plants, and small pieces of bark cut from slightly darkened areas of an apparently vigorous plant. It occurred on young diseased twigs in Massachusetts and on root bark in North Carolina. (Division of Fruit and Vegetable Crops and Diseases).

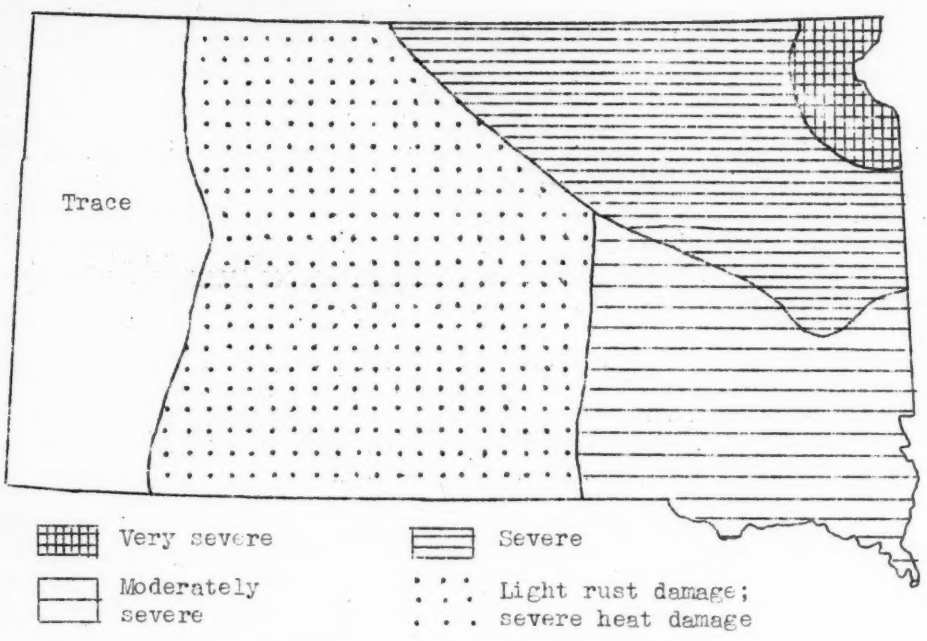
THE 1935 STEM RUST EPIPHYTOTIC IN SOUTH DAKOTA

H. H. Klages

The relative severity of stem rust (Puccinia graminis) on wheat in various parts of South Dakota during the past season is shown on the accompanying map (Figure 24). I must give credit to Mr. George Eade of the Barberry Eradication division for assistance in making up this map.

It was very difficult to arrive at an estimate of the exact loss that may be attributed to stem rust, in the case of both wheat and barley. The yields were greatly decreased by the effects of both rust and extremely high temperatures during the post-heading period. On the station at Brookings, for instance, even our hybrid material, which showed only traces of stem rust, had low test weights per bushel due to heat and drought damage.

Practically all of the winter wheat matured before stem rust made very much headway, although there was a considerable amount of leaf rust (Puccinia triticina) on winter wheat in the southeastern portion of the State.



Unshaded: Trace of stem rust

Fig. 24. Comparative severity of stem rust on wheat in various regions of South Dakota, 1935.

Durum wheats were not so severely affected by stem rust as the hard red spring wheats. Durum wheat planted in the proper season, that is, about the middle of April, showed an average of about 20 percent infection. A large percentage of our Durum wheat was planted rather later than usual last year, due to weather conditions, and the amount of stem rust on this late planted crop was materially greater than that on the early plantings. Many of these late fields showed as much as 40 percent infection.

On the whole, I consider the estimate of 40 percent loss from stem rust in South Dakota in 1935 rather conservative. This estimate applies, of course, to all three market classes of wheat grown in the State. (South Dakota State College of Agriculture and Mechanic Arts).

BOTRYTIS BLIGHT OF EUPATORIUM IN NEW JERSEY IN 1935

Cynthia Westcott

Last October I noticed an epiphytotic of blight caused by Botrytis, of the cinerea type, on Eupatorium in gardens in the vicinity of the Oranges and Montclair. It was not a case of invasion of old flower stems but a definite parasitic attack of the green stems. Tan lesions were formed six to twelve inches from the base of the stem. The tops died quickly above the lesions, but branches originating below them remained green. The fungus appeared to be definitely parasitic, and attacked strong and vigorously growing plants.

SECOND EXPERIMENTAL FORECAST OF THE INCIDENCE OF BACTERIAL WILT OF CORN

Neil E. Stevens

Two points should be emphasized in connection with this forecast: First, it applies only to the northeastern United States, including eastern Ohio and northern Virginia, where regular surveys have been made for the last five years. Second, it is purely experimental and designed to test the hypothesis advanced two years ago that the prevalence of bacterial wilt (Aplanobacter stewarti) in this area in any given growing season is correlated with the temperature during the preceding winter.

To point out, at this time, that the winter of 1935-36 has been cold in the eastern United States, may seem a work of supererogation and a waste of space in the Plant Disease Reporter; however, unless the hypothesis which these forecasts are designed to test is earlier proved to be erroneous, the present studies should be continued for at least ten years. In the interests of continuity, then, it may be worthwhile to record here the winter temperature indices for the stations used in previous years (P.D.R. 18:141-149;19:69-70). This information is given on the accompanying map (Fig. 25). It will be remembered that winter index is simply the sum of the mean temperatures of December, January and February.

Comparison of the indices of the past winter with those of previous years or with "normal" indices, shows, of course, that the winter temperatures throughout the region were well below the average. The departures from normal and the differences as compared to recent winters vary greatly in different areas and may be followed in detail by comparison of the maps or perhaps more easily by curves drawn for a few representative stations (Figs. 27 and 28) which are plotted in terms of winter temperature indices.

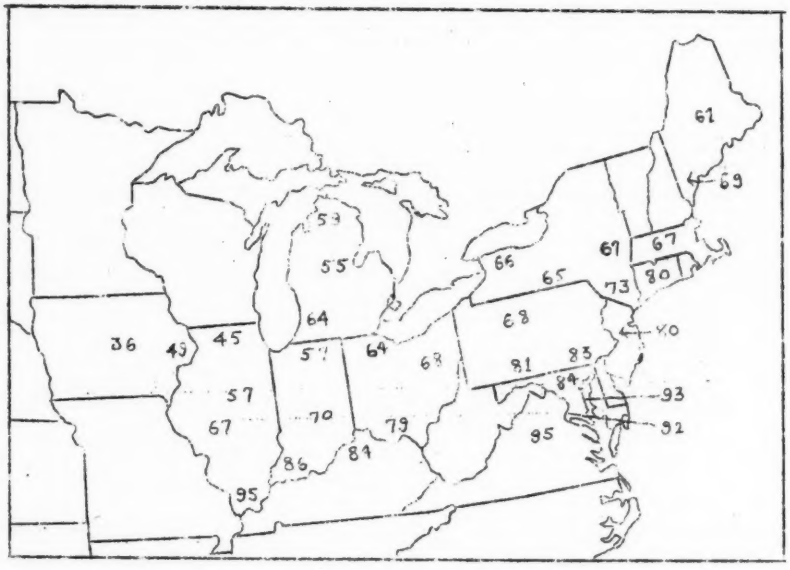


Fig. 25. Winter temperature indices for 1935-36.

The change from the very warm winter of 1932-33 to the cold winter of 1933-34 meant at Charlottesville, Virginia, merely a drop to normal, whereas in New York and New England (see curve for West Point, New York and Portland, Maine) that winter was far below normal. On the other hand, the winter just past, 1935-36, was much colder in Virginia and Maryland (see curve for Charlottesville) than the average or any recent winter.

On the basis of winter temperature indices alone, if the hypothesis now being tested is correct, one would expect some reduction in the amount of the disease along the southern portion of this area, and little change in the amount of disease in New York and New England.

There should also be considered the possibility suggested by one competent field observer who is a frank critic of this idea, namely, that the difference is merely in the time of appearance of the disease. Obviously, during the coming summer, special attention should be given to the severity of the disease along the Ohio and Potomac rivers early in the season, and to the time of its appearance.

In the important market garden areas of eastern Pennsylvania, southeastern New York, and northern New Jersey, 1934-35 was warmer than either the preceding or the following winters. This relation will give added interest to developments during the coming season in this area,

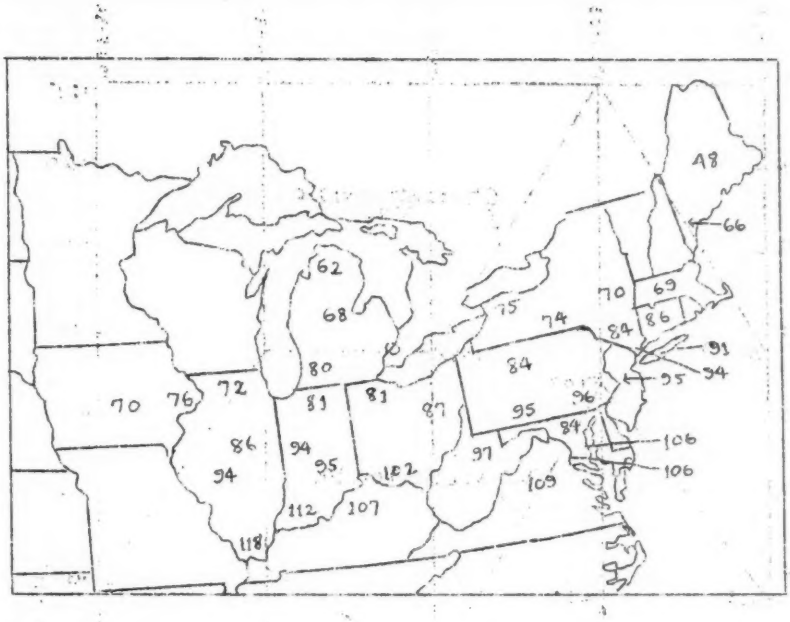


Fig. 26. Winter temperature indices for 1934-35.

particularly in view of the conditions reported in Nassau County, Long Island, during 1935 by Richards (P.D.R. 19, page 286).

Winter temperature conditions in the Middle West during recent years have varied decidedly from those in the northeastern states. The high point in the Middle West was reached in the winter preceding the growing season of 1932, and the three succeeding winters, while decidedly cooler, were still above normal. The winter just past, however, has been of almost unprecedented severity. If, then, one would undertake to forecast the behavior of the disease in this area, which, on the basis of present information I am not prepared to do, he would expect a decided recession, either in the amount of disease, its northern limit, or time of appearance, or perhaps all three. (University of Illinois).

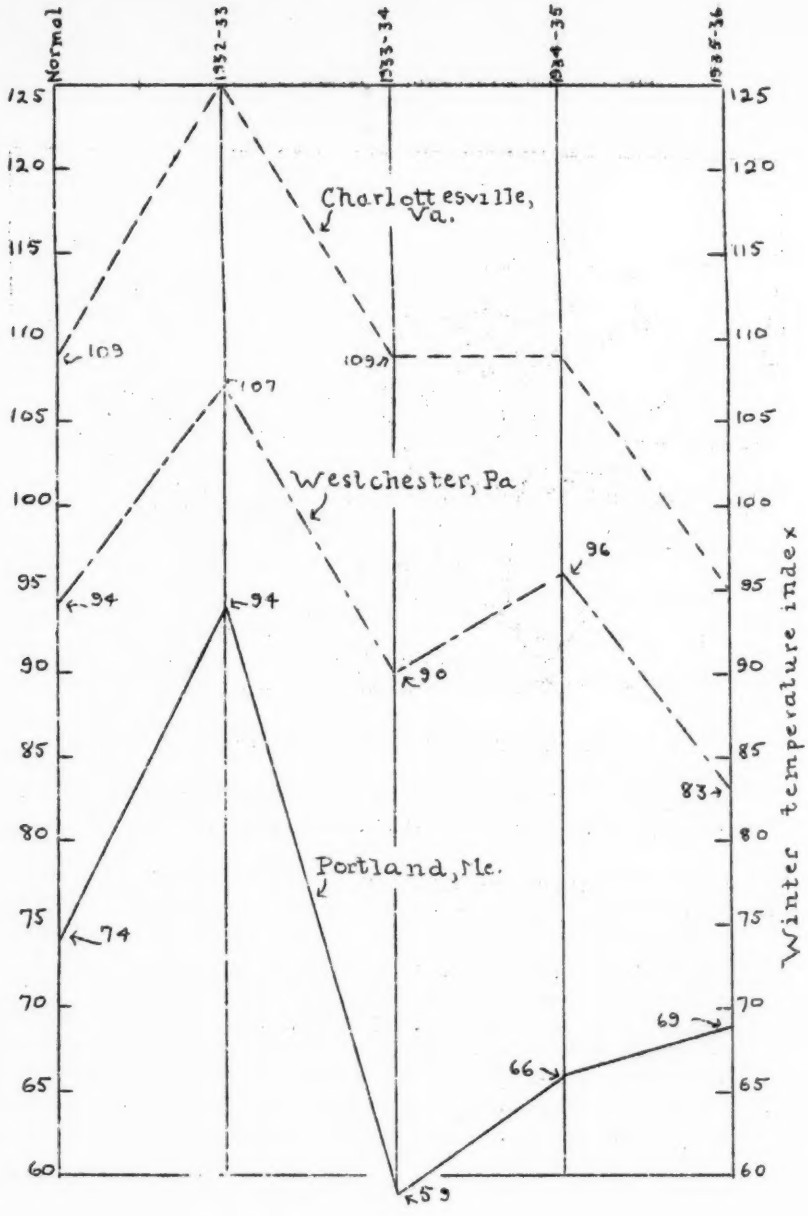


Fig. 27. Temperature indices of recent winters compared with normal, at Charlottesville, Va., Westchester, Pa., and Portland, Me.

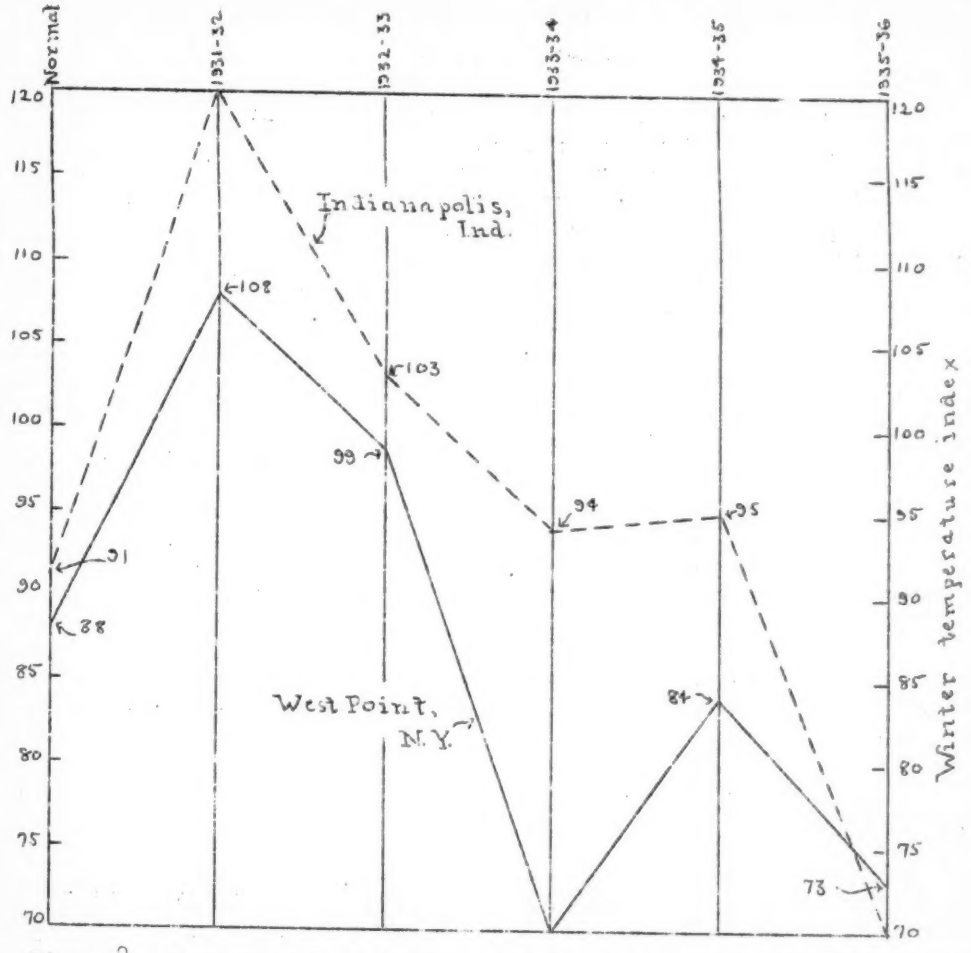


Fig. 29. Temperature indices of recent winters compared with normal, at Indianapolis, Ind., and West Point, N. Y.

LEAF REDDENING IN WINTER OATS IN WESTERN OREGON

Roderick Sprague

Fall-sown oats and sometimes early spring-sown oats in western Oregon very commonly show a brilliant red coloration in the leaf tips or throughout the entire green portions of the plants. The condition is especially common in oats growing in poorly drained soils, but is sometimes prevalent in oats growing in the red hill soils or in apparently mellow and fertile soils. During March and April or sometimes as early as February (1934 in particular) numerous inquiries are made as to the cause and cure of the red leaves.

General observations and the results of some experimental study show that the pigment concerned, anthocyanin, is indicative of unbalanced or pathological conditions in the oat plant. There is evidence that the following factors cause most of the red leaf of oats in Oregon.

(1) Excessive soil moisture and resulting decrease in oxygen supply to the roots coupled with increased soil acidity and depleted available nitrogen in late winter. Results of tests indicate that powdered calcium cyanamid applied at the rate of 100 pounds per acre permits the grain to recover rapidly if applied in early spring.

(2) An excessive top growth induced by a long growing season in winter (1933-34) coupled with poor root systems which are growing in the cold wet soils.

(3) Low temperature injury either to the entire plant or frequently to the chloroplasts themselves.

(4) Soil-borne root rots and footrots. Fusarium culmorum (W. G. Sm.) Sacc. is particularly widespread and destructive and it materially increases the amount and intensity of the red-leaf symptoms on oats. It causes much of the red coloration in spring sown oats both in western Oregon and southwestern Washington. D. E. Stephens has observed the red-leaf symptoms in oats sown in the spring on the experiment station at Moro in eastern Oregon. The plants so affected are nearly always infected with Fusaria, mostly F. culmorum leteius.

(5) Leaf spotting, streaking, and mottling caused by Pseudodiscosia avenae R. Sprague and A. G. Johnson (described in Mycologia, March-April issue) is an obscure disease which is characterized by leaf lesions of a somewhat leathery reddish aspect. The disease was found in Klickitat County, Washington, in 1934 and had been seen previously in Lincoln County, Oregon, in small amounts in 1932. On March 18 of the current year a brief survey was made in Benton, Linn, and Polk Counties, Oregon, in the approximate center of the Willamette Valley. The disease was found in every field and on almost every plant in these fields. On oats it was almost as common as the Rhynchosporium disease on barley at this time of year. Since the oat leaf spot is becoming of economic importance

a popular name is needed for this specific disease and "red leather leaf" disease of oats is proposed.

The true winter oat variety, Gray Winter (Oregon Winter Turf) is resistant to red leaf and to most of the parasites involved. There is a considerable amount of spring oats grown such as Victory in the Willamette Valley or Schoolmam in the Coast region which are sown in the fall for temporary covering for newly-sown legumes or for spring pastures. These non-hardy oats are highly susceptible to all phases of red leaf. Red oat varieties belonging to Avena byzantina are considered semi-hardy but observations in Oregon show that varieties such as Red Rustproof are very susceptible to footrot and to the various accompanying disturbances.

Where spring oats are subject to red-leaf troubles Schoolmam seems to be slightly more resistant than the Victory variety. However, in the Coast region where crown rust is a deciding factor Schoolmam is preferred. The late maturing Shadeland Eclipse (spring-sown) is resistant to red leaf and is grown on certain low wet soils. (Division of Cereal Crops and Diseases).

WINTER INJURY TO PEAR BLOSSOMS IN ARKANSAS THIS YEAR

H. R. Rosen

Pear trees (Kieffer and Garber varieties) in northwestern Arkansas are showing, as a whole, an exceptionally heavy bloom this season, the blossoms commencing to open on March 21. Superficially the flowers appear wholly normal with full development of pedicels, sepals, and petals, and are otherwise so apparently healthy in appearance that any grower might readily expect a full crop, barring adverse weather and disease. However, a careful study of these blossoms shows that fully 95 percent possess no styles, or only rudimentary portions of styles which in most instances have not quite reached the level of the nectarial disc and are confined to the lowermost portion of the stylar tube. Under a low-powered binocular the tips of these greatly reduced styles appear brownish and show little or no development of stigmatic surface. The ovules are lacking in most blossoms, with a few showing rudimentary or ill-defined ovules and locules. In some instances there were indications of abnormal cell multiplication with the production of a granular tissue replacing the ovules.

The stamens likewise show varying degrees of underdevelopment. In many instances the filaments are very short and are capped by rudimentary anthers or by none at all. However, in most blossoms there are a sufficient number of fully developed stamens so that there is no evident shortage of pollen grains. The chief abnormality displayed by these blossoms concerns the styles.

Since the period included in blossom expansion has not been characterized by any excessively low temperatures, the only reasonable explanation for the extreme amount of blossom injury concerns the prolonged cold weather prevalent in the Ozarks throughout the months of January and February. Although the temperature at no time went below zero Fahrenheit in the region being considered, which probably accounts for the normal appearance of outer floral whorls, the extreme amount of comparatively cold winter weather for this area is probably in large measure responsible for the abnormalities indicated, though a marked shortage of normal rainfall for this period may also be considered. It is, of course, well known that pistils are generally more sensitive to low temperature injury than other floral parts and Heald in his "Manual of Plant Diseases" records Whipple's observations of winter injury to apple and pear buds in Montana, which include observations similar to those here described (p. 160 of the first edition and p. 165 of the revised edition).

Evidently there will be few or no pears produced in the main apple growing area of Arkansas this year. (Arkansas Agricultural Experiment Station).

WINTER INJURY TO PEACH TREES IN NORTH CAROLINA

R. F. Poole

In the sandhill area of this State all varieties of peaches were injured severely by the extremely cold weather of the past winter. Some damage occurred throughout the area in every orchard. The most severe damage was in low areas and on trees two to three years of age. All varieties, including Augbert, Hale, Elberta, Hiley Bell, Georgia Bell, and Red Bird were injured. Destruction of buds was most pronounced on the vigorous new wood developed toward the end of the season. Both fruit and leaf buds had shed leaving perfect scars on many of the twigs. Buds on the upper branches that had grown more slowly were not injured severely. In some cases the tissues of the wood were killed and the characteristic brown oxidase staining was evident. On two- to three-year-old trees dying in low areas the brown color had been formed deep into the bole. These trees were easily spotted on March 26, because of the absence of blooms and leaves which were prominent on trees that were not severely injured. Despite the injury there will be an abundance of fruit if later frosts do not destroy the fruit already set. (North Carolina Agricultural Experiment Station, March 31).

EARLY DEVELOPMENT OF THE APPLE SCAB AND PEACH BROWN ROT FUNGI

Reports from Massachusetts and Pennsylvania indicate that spores of the apple scab fungus (Venturia inaequalis), are maturing earlier than

usual this year. O. C. Boyd states that on March 24 spore development was the most advanced he had ever seen it in Massachusetts. He continues:

"In fact, spore development in the college orchard is in about the same stage as it ordinarily is at the delayed dormant spray, -- and buds have barely started to swell.

"There are two factors believed to have contributed to this unusual situation. In the first place, the prolonged mild weather last fall allowed the fungus to undergo marked development in the dead leaves before hard winter weather set in. This spring, just as the snow was disappearing under the trees, around March 10 to 13 in the Connecticut Valley orchards, the more mature perithecia were two-thirds grown and asci were beginning to form.

"The second and more important factor involved is the abnormally mild and wet weather we have experienced over all the state since the snow disappeared,--weather more typical of early May than of March! In fact, during that period extending to the present date, the temperature-moisture conditions have been ideal for the scab fungus, with bud development at a standstill.

"On March 20, just a week after the snow left, perithecia showed all stages of development from no asci at all up to a few sacs containing full-sized, two-celled spores, but no colored (mature) spores. Today, after four additional mild days with damp soil and damp lower leaves, the older perithecia show an occasional ascus with mature spores which shot in the water mount under the microscope. Such perithecia, however, are not sufficiently developed to expel spores in the orchard. This is just about the same stage we ordinarily encounter when the delayed dormant spray goes on."

On March 28 he reports, "Spores are now in the usual pre-pink stage, shooting from the old leaves. Apple buds are just beginning to swell."

Early development of the scab fungus is reported from Pennsylvania also, by R. S. Kirby, who writes on March 31, "Mature scab spores were found as early as March 30 in southeastern Pennsylvania. The spores are maturing several days earlier than in 1935."

In North Carolina, according to R. F. Poole, the constant rainfall during February and March has made moisture conditions ideal for the development of apothecia of Sclerotinia fructicola. He reports on March 31

"On March 22 apothecia of Sclerotinia fructicola were found in great abundance around seedling trees where the entire peach crop had

been destroyed by brown rot in 1934 and 1935. The apothecia were apparently developing from mummies produced during the two seasons, since they were in some instances growing singly from sclerotia buried in the soil and entirely free from the lignin tissue of mummies such as those produced in 1935 which were easily identified. The apothecia were found in four commercial peach orchards. As many as thirty were found on individual mummies. Some were five-eighths inch in diameter, many were smaller. Those found on March 25, when touched, ejected such large masses of spores that they were clearly seen. In the College Orchard, mummies partly buried in the Cecil Clay soil that had been cleaned of grass around the trees were most productive of apothecia. Those in Bermuda grass in this orchard were less productive. Fruit that had fallen prematurely as a result of arsenical injury and before it had become infected with Sclerotinia did not produce apothecia in five orchards in both the piedmont and sandhill areas. Trees of all varieties were in full bloom during the period that the apothecia were found. Up to this time no infection of blossoms and twigs has occurred."

BRIEF CURRENT NOTES ON PLANT DISEASES

Downy Mildew on Spinach in Tidewater Virginia: A recent survey of local spinach fields showed the presence of an average of 6.4 percent plants systemically infected with downy mildew (Peronospora effusa). In some places the number of systemically infected plants amounted to as much as 17 percent.

The past winter has been unusually severe and the large survival of mildew infected plants indicates that they are no more susceptible to cold injury than the healthy ones. (Harold T. Cook, Virginia Truck Experiment Station, March 18.)

Hollyhock Rust in New Jersey: Hollyhock rust (Puccinia malvacearum) is always present as soon as the leaves can be seen. I collected my first for this year March 13. (Cynthia Westcott).

Snowmold on Grass in Lawns and Golf Greens in Pennsylvania and New Jersey: R. S. Kirby reports on March 31, "In Center, Berks, and Philadelphia Counties, snowmold (Typhula graminum) is more destructive and widespread on lawns and golf greens than I have ever seen it before in Pennsylvania." Cynthia Westcott reported it as occurring in patches scattered over the lawn of a large garden at Glen Ridge, New Jersey. (March 14).

SPECIMENS OF TAPHRINA WANTED

Dr. A. J. Mix, of the Department of Botany, University of Kansas, Lawrence, Kansas, would like to have material of species of Taphrina. He wants particularly Taphrina coerulescens from as many species of oaks as possible, plum pockets from various wild and cultivated plums, and any Taphrinas on ferns. Material should be freshly collected, pressed as for the herbarium for twenty-four hours, then mailed at once to Dr. Mix at the address given.

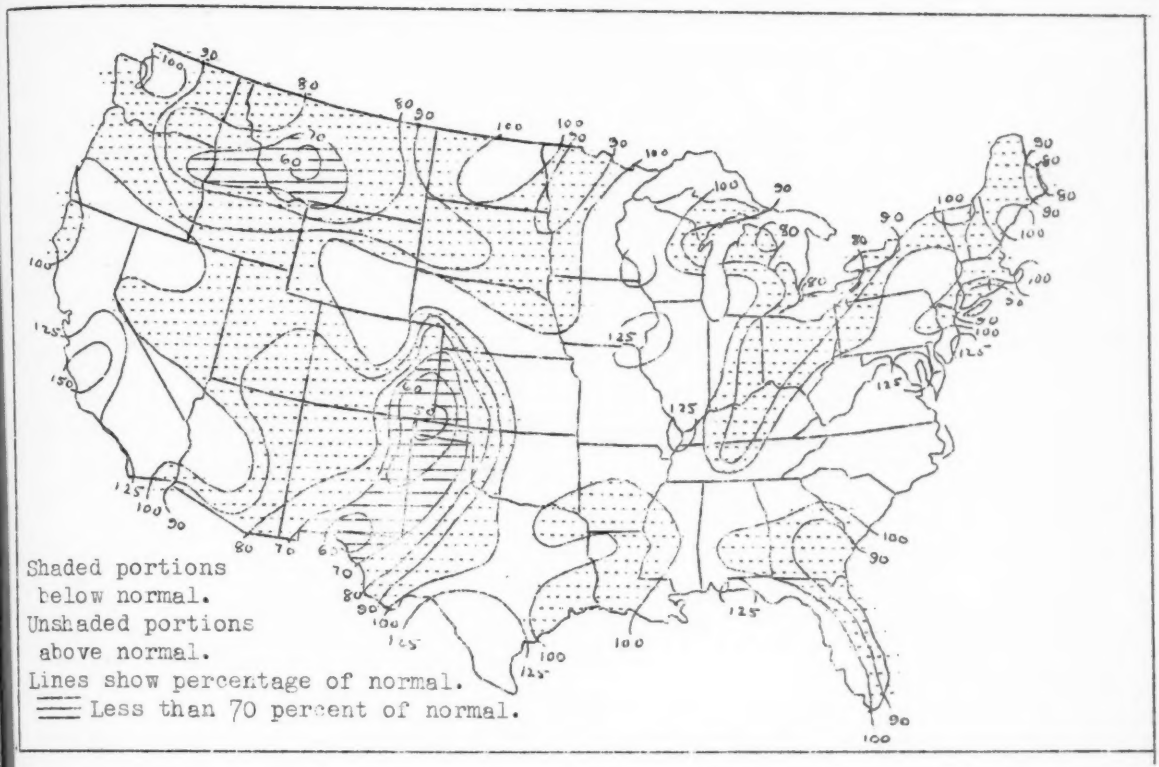


Fig. 29. Percentage of normal precipitation for the 18 months, September 1934 to February 1936, inclusive.

PRECIPITATION SINCE THE DROUGHT OF 1934

The accompanying map, figure 29, taken from the Weekly Weather and Crop Bulletin for the week ending March 17, is self-explanatory. It should be noted that the shading is the reverse of usual, that is, below normal is shaded on this map instead of above normal.